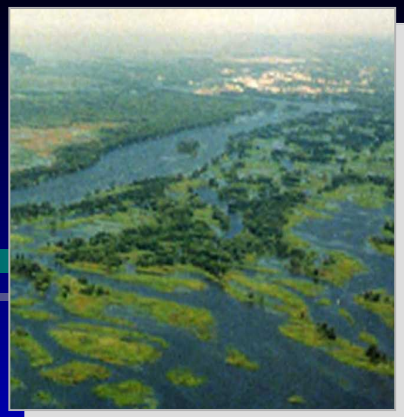
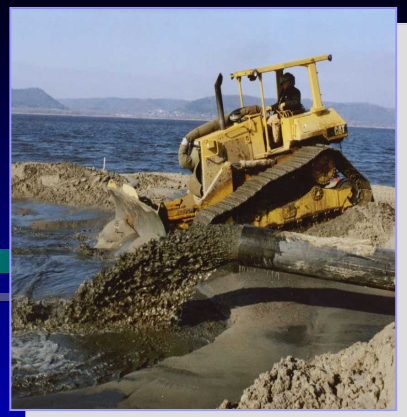
US Army Corps
of Engineers
St. Paul District

Floodplain Restoration on the UMR

U.S. Army Corps of Engineers
St. Paul District

US Army Corps
of Engineers
St. Paul District





The UMRS Environmenta Management Progra

US Army Corps of Engineers
St. Paul District

Upper Mississippi River Environmental Management Program

V018JS01

US Army Corps
of Engineers
St. Paul District

In the beginning . . .

US Army Corps
of Engineers
St. Paul District

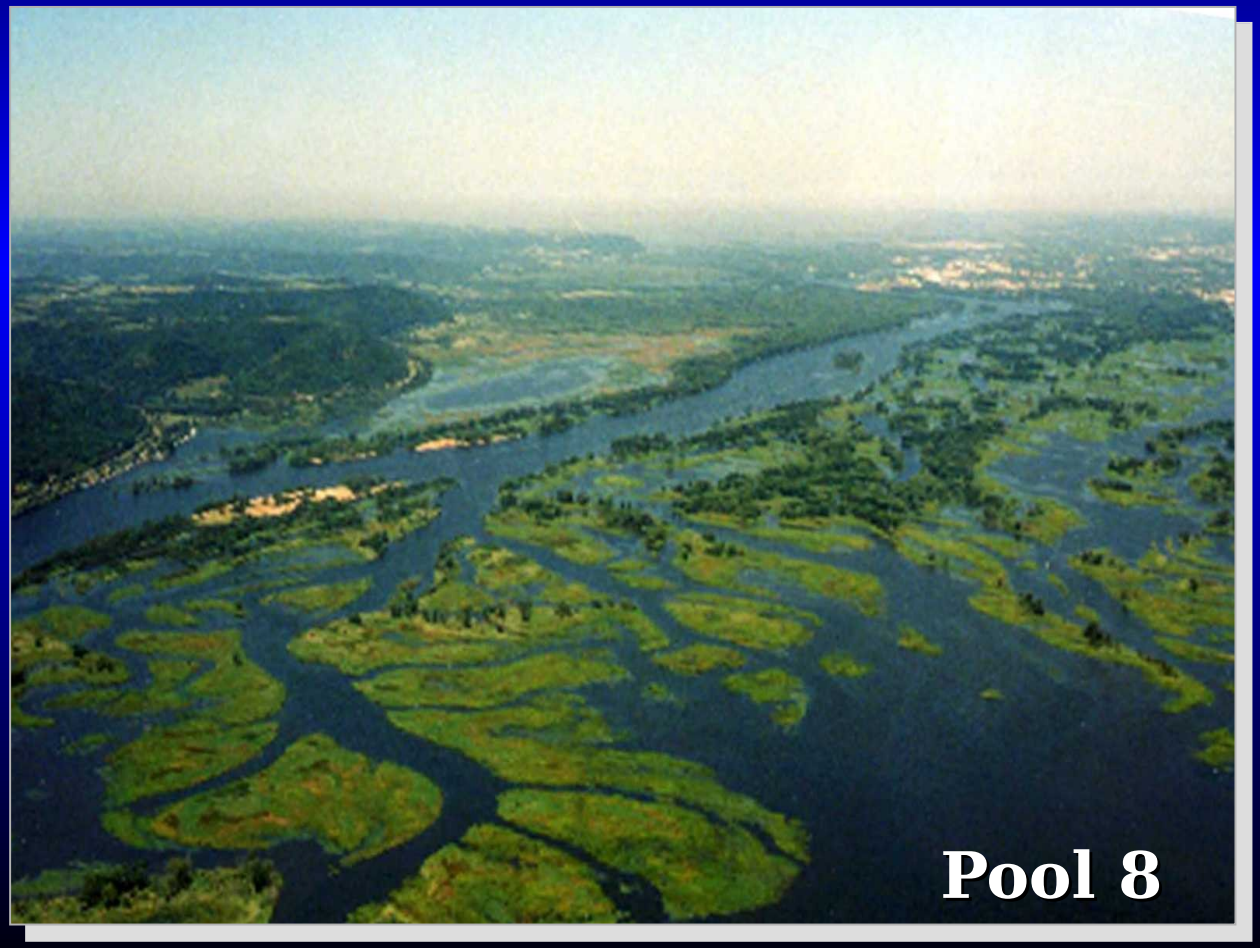
Backwaters

Lock and Dam
No. 10
Guttenberg, Iowa

Pool
9

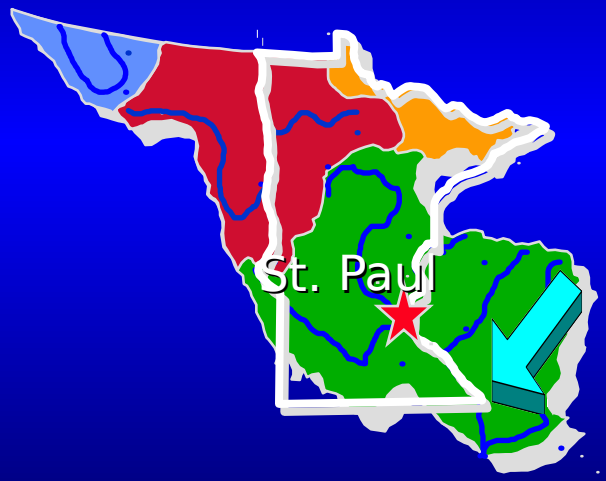
US Army Corps
of Engineers
St. Paul District

Sedimentation



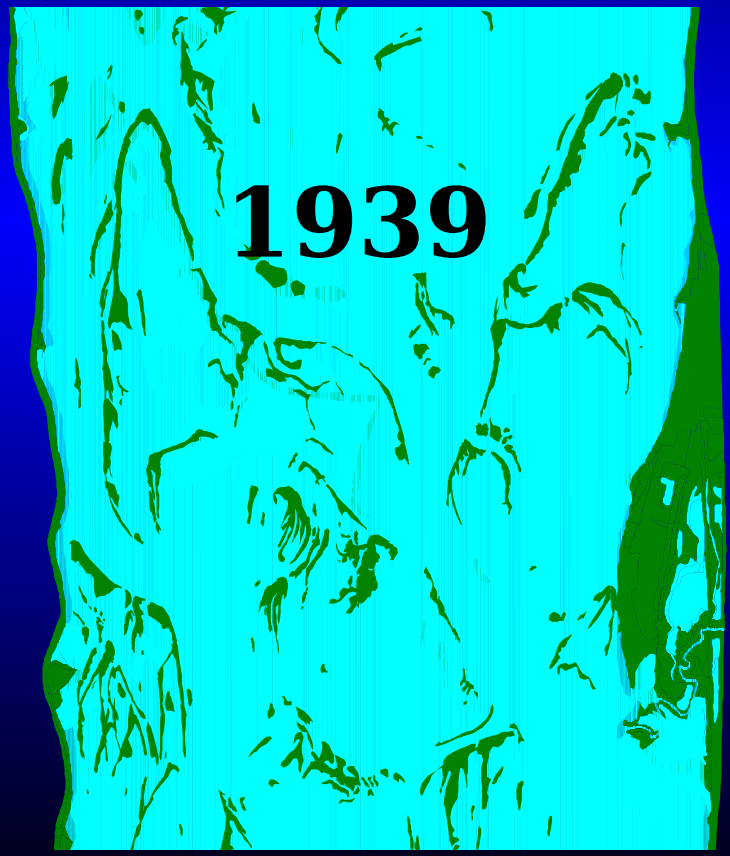
US Army Corps
of Engineers
St. Paul District

Pool 8 Islands, WI



US Army Corps
of Engineers
St. Paul District

Island Erosion



US Army Corps
of Engineers
St. Paul District

Geomorphic Response

US Army Corps
of Engineers
St. Paul District

Island Design

US Army Corps
of Engineers
St. Paul District

Pool 8 Islands
Phase I Stage 1

US Army Corps
of Engineers
St. Paul District

Pool 8 Islands Phase I

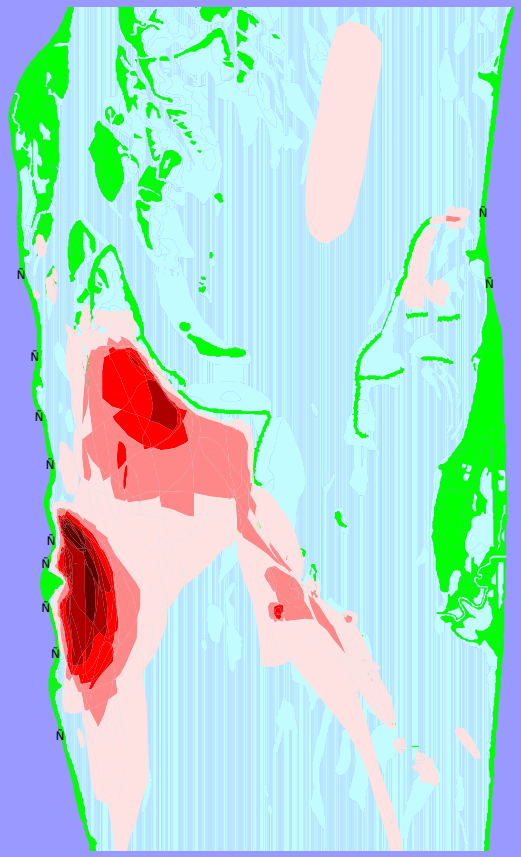
US Army Corps
of Engineers
St. Paul District

Pool 8 Islands Phase II

1999 Lower Pool 8
Waterfowl Ground Surveys - Puddle Ducks

ıtions
‹ Locations
ences
ences
ences
ırrences
ırrences

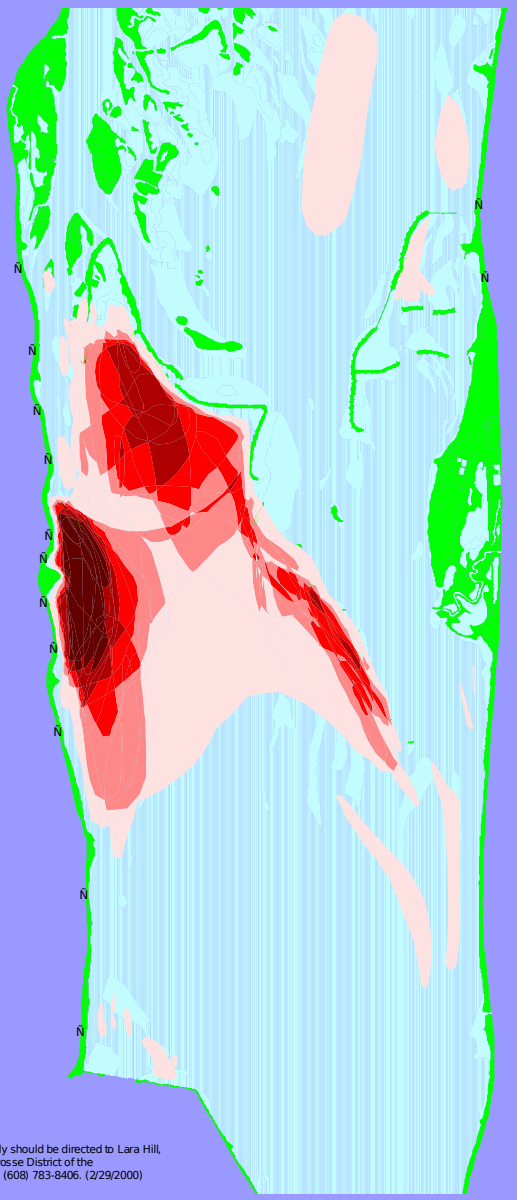
20 times
e weekly
nd times.
ıs on the
ock and
esota along
Hwy. 35 on
ınd a spotting
e the
waterbird
mbers were
d the
waterbird
on the back
erbird
a digital
ions were
ŋ ArcView.



1999 Lower Pool 8
Waterfowl Ground Surveys - Tundra Swans

:ations
ıtions
ırrences
rrences
rrences
ırrences
currences
:r

ł 20 times
ice weekly
and times.
ps on the
Lock and
nesota along
g Hwy. 35 on
and a spotting
ate the
f waterbird
umbers were
ınd the
e waterbird
› on the back
aterbird
› a digital
ations were
ng ArcView.



N

1 Miles

Upper Mississippi River
National Wildlife
and Fish Refuge

Questions regarding this study should be directed to Lara Hill, Wildlife Biologist at the La Crosse District of the Upper Miss. Refuge. Phone: (608) 783-8406. (2/29/2000)

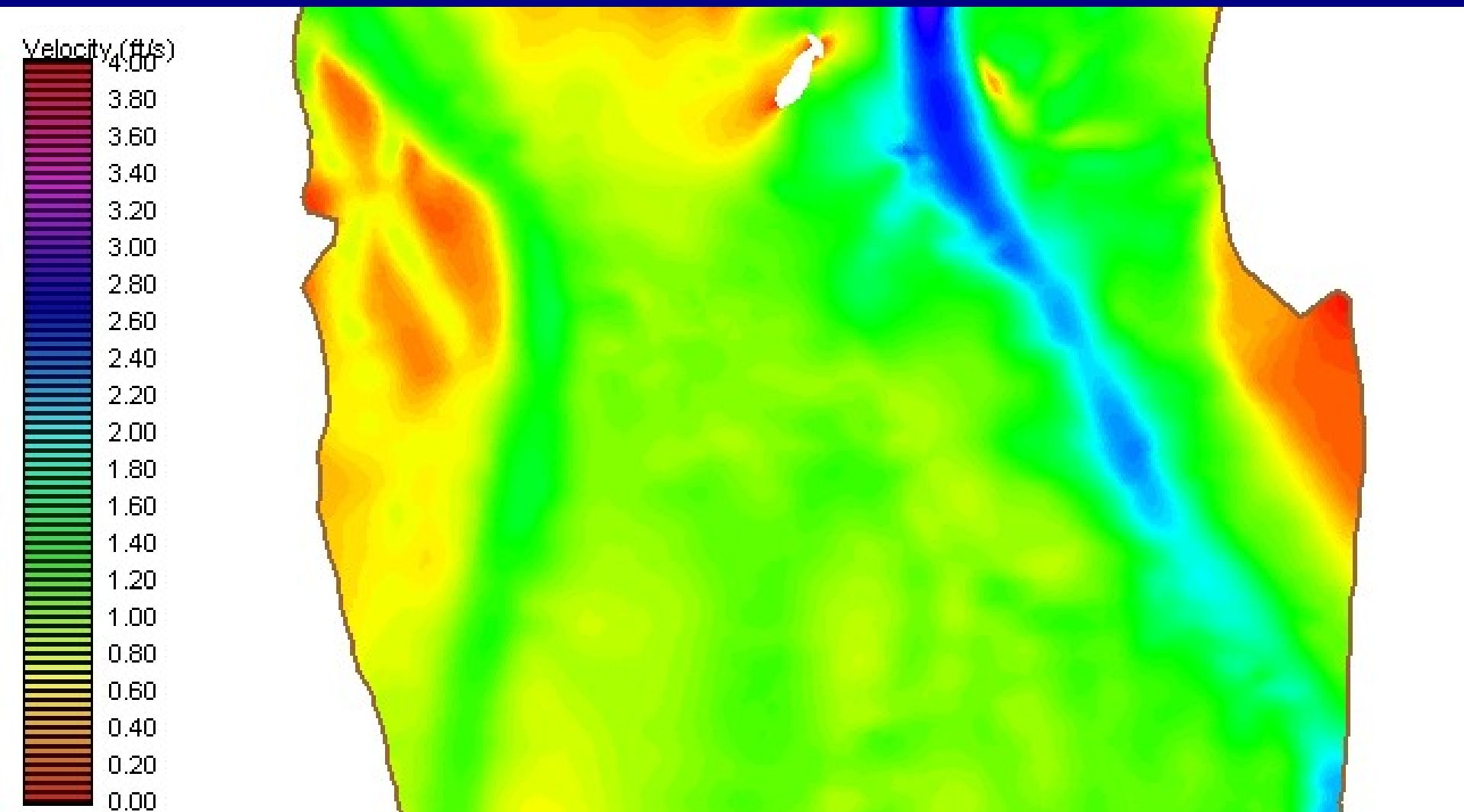
US Army Corps
of Engineers
St. Paul District

Island Layout

PAST	PRESENT
Reduce Sediment Load To Backwaters	Partially Restore Riverine Conditions. Qc >> Qf for Bankfull Conditions.
Reduce Wave Action	Wind Fetch < 4000’ in Shallow Areas (< 4’ deep)
Waterfowl & Fish Habitat	Fish: v < .01 fps, d > 4’ Ducks: Create Visual Barriers & Mudflats

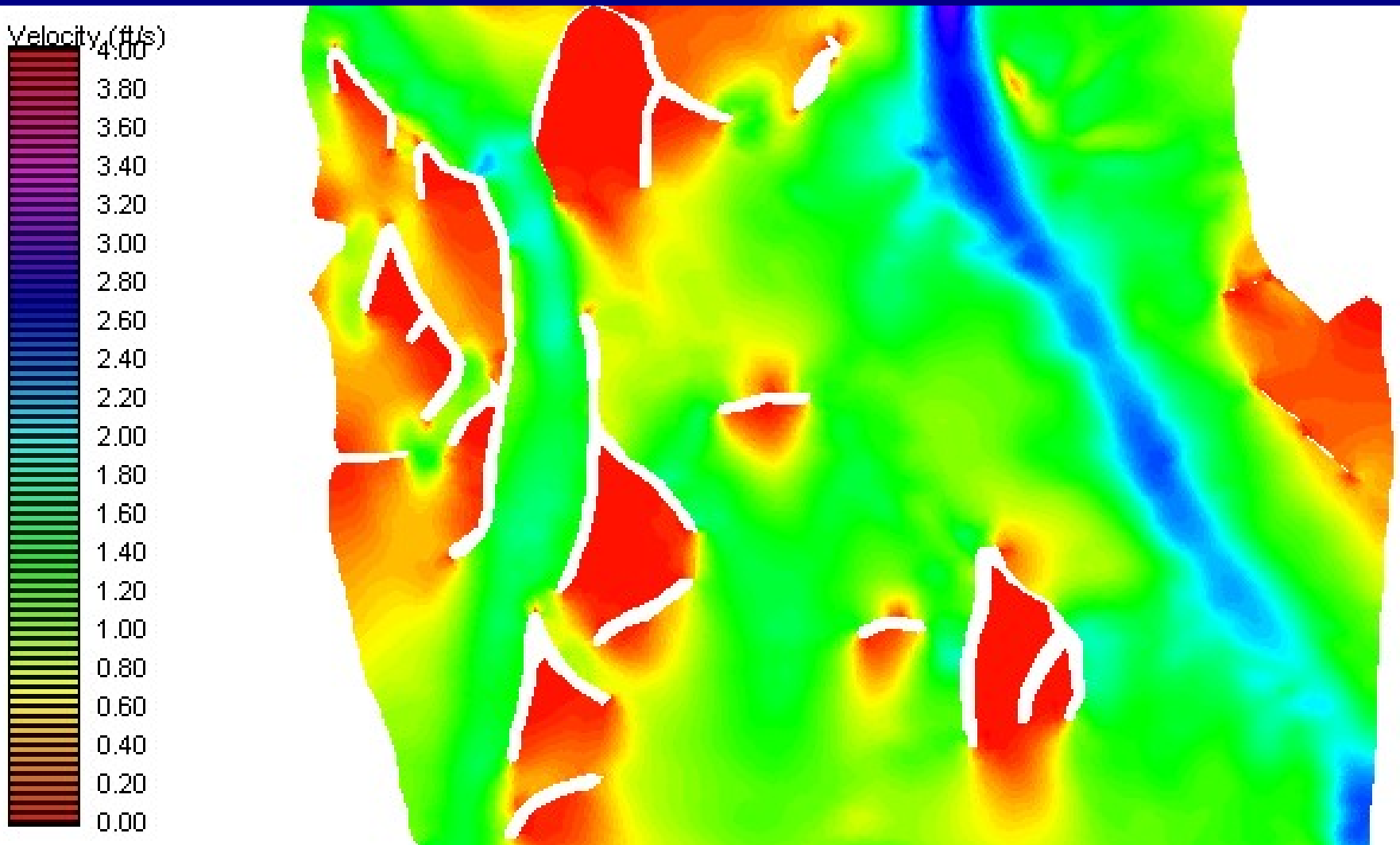
US Army Corps of Engineers
St. Paul District

Pool 8, Phase 3 Existing Conditions Velocity



US Army Corps of Engineers
St. Paul District

Pool 8, Phase 3 Proposed Conditions Velocity

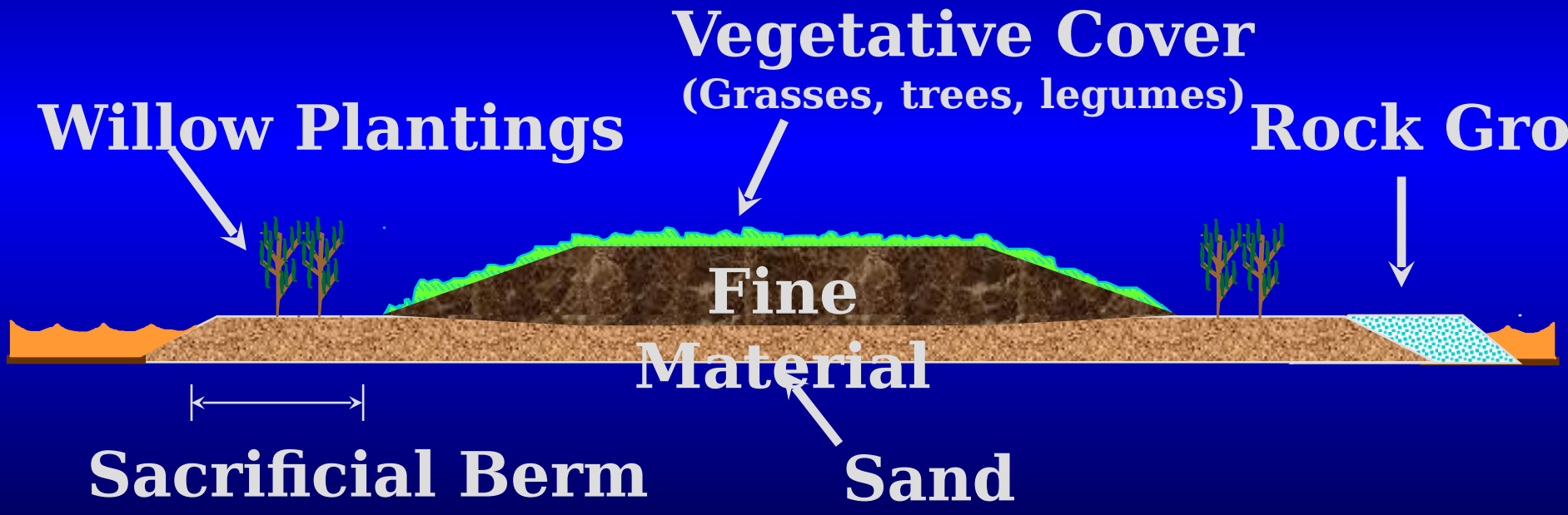


US Army Corps
of Engineers
St. Paul District

Pool 8, Phase 3 Layout

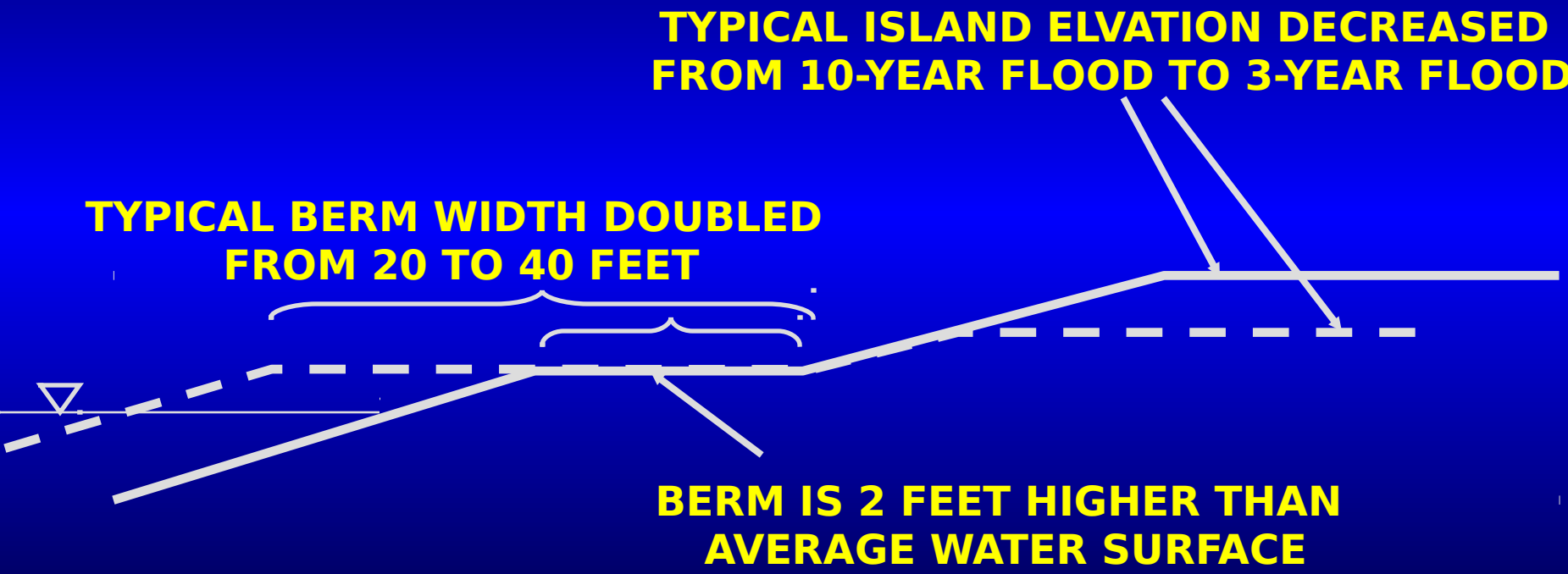
US Army Corps
of Engineers
St. Paul District

Island Cross Section



US Army Corps
of Engineers
St. Paul District

Island Cross-Section Changes


TYPICAL ISLAND ELVATION DECREASED
FROM 10-YEAR FLOOD TO 3-YEAR FLOOD
TYPICAL BERM WIDTH DOUBLED
FROM 20 TO 40 FEET
BERM IS 2 FEET HIGHER THAN
AVERAGE WATER SURFACE
LAKE ONALASKA, 1989
POOL 8 PHASE III, 2001

US Army Corps
of Engineers
St. Paul District

Topsoil

PAST	PRESENT
Percentage of fines > 40	Percent Fines Between 40 and 70. Sand is Required to Provide Optimum Substrate for Plants.
Vegetation Stabilizes Earth Structure During Floods	Vegetation and Topsoil With Cohesive Properties Stabilizes Earth Structure During Floods

US Army Corps
of Engineers
St. Paul District

Polander Lake, 2001

US Army Corps
of Engineers
St. Paul District

Pool 8, Phase II, 2001

US Army Corps
of Engineers
St. Paul District

Shoreline Stabilization

US Army Corps
of Engineers
St. Paul District

Type of Stabilization

PAST	PRESENT
RIPRAP	BIOTECHNICAL = INERT MATERIAL LIKE ROCK AND LOGS COMBINED WITH VEGETATION

US Army Corps
of Engineers
St. Paul District

Riprap

US Army Corps
of Engineers
St. Paul District

Biotechnical: Rock Groins

US Army Corps
of Engineers
St. Paul District

Biotechnical:
Off-Shore Rock Mound

US Army Corps
of Engineers
St. Paul District

And Then Someone Said “This is too Stable”

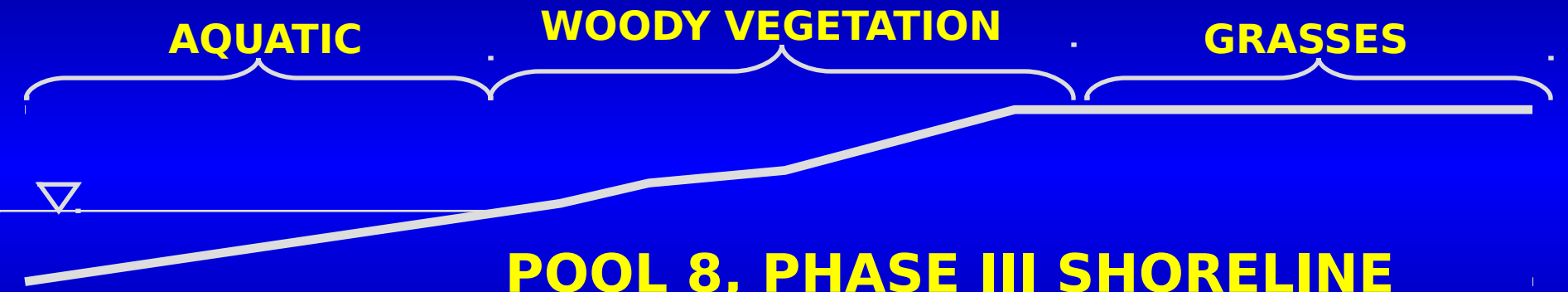
US Army Corps
of Engineers
St. Paul District

"We Would Like Mudflats, Sandbars, and Beaches"

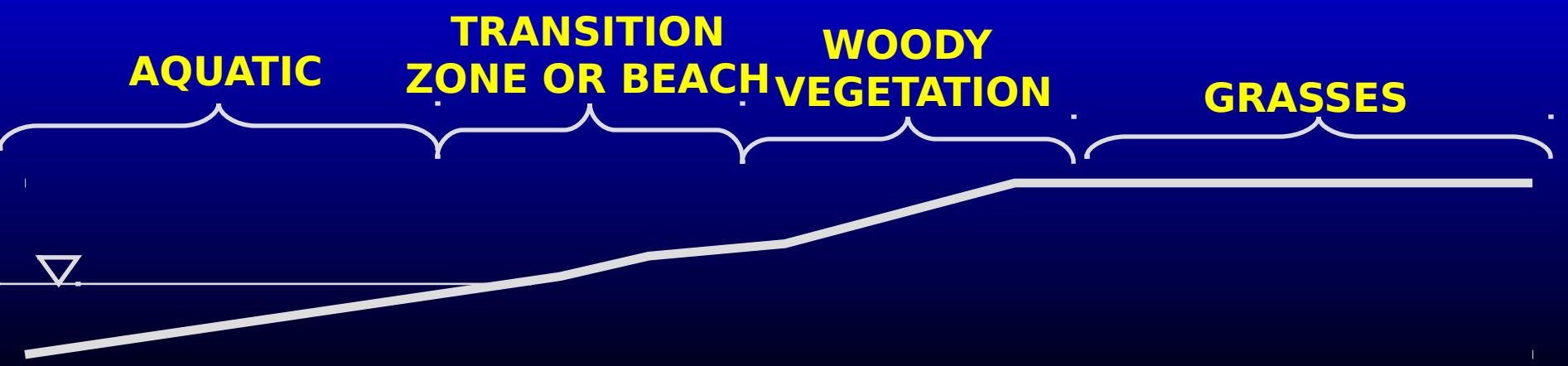
US Army Corps
of Engineers
St. Paul District

Shorelines

POOL 8, PHASE II SHORELINE

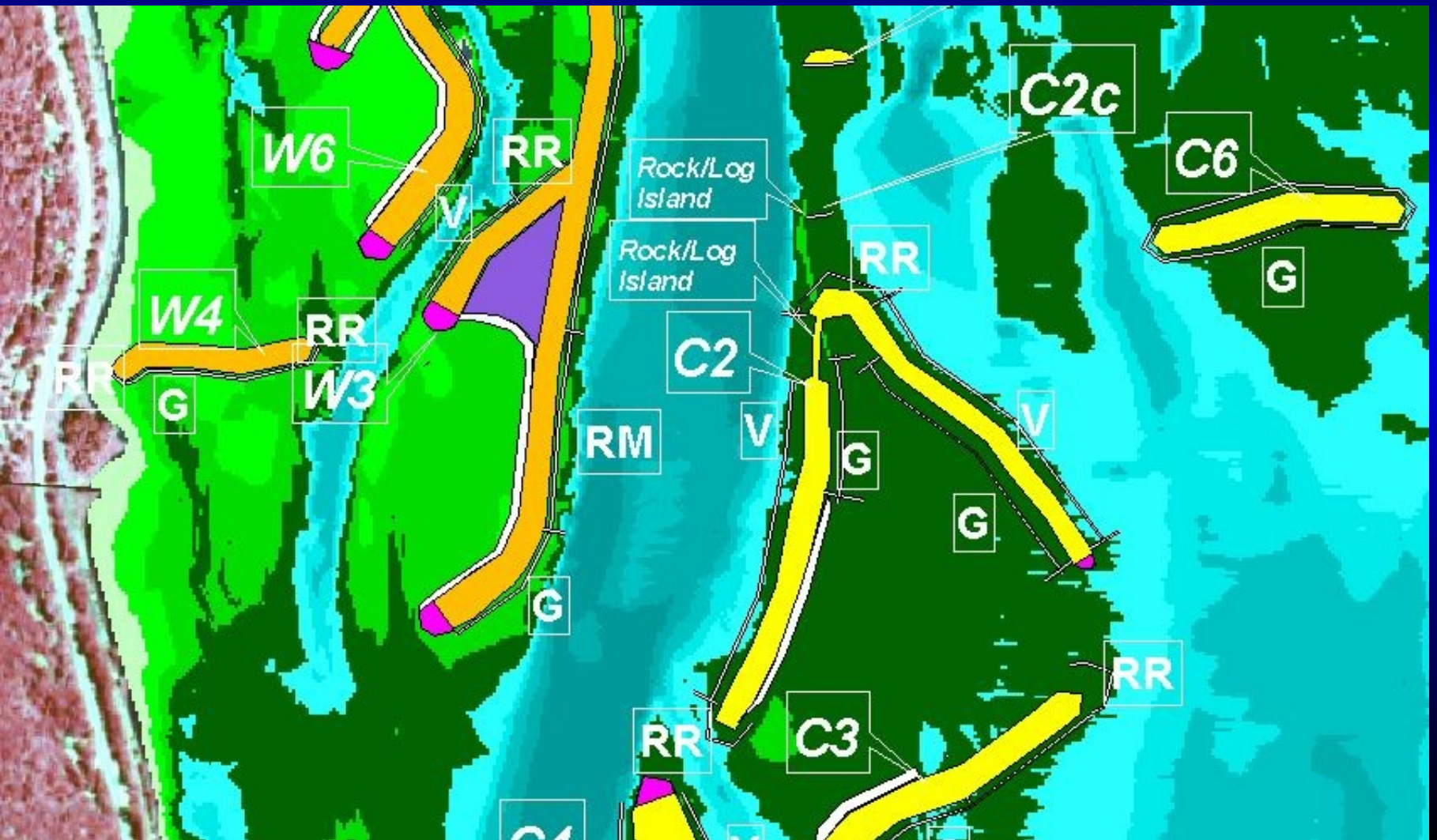


POOL 8, PHASE III SHORELINE



US Army Corps of Engineers
St. Paul District

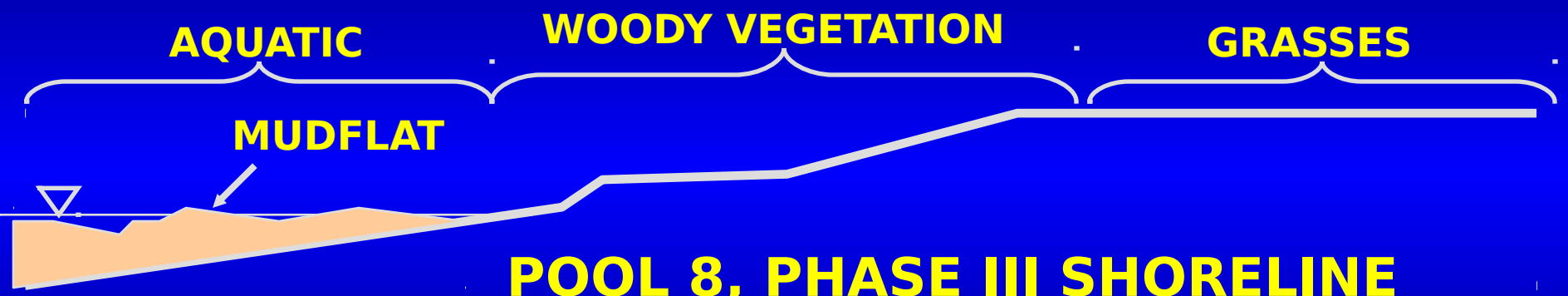
Designing for Controlled Erosion and Stable Water Levels



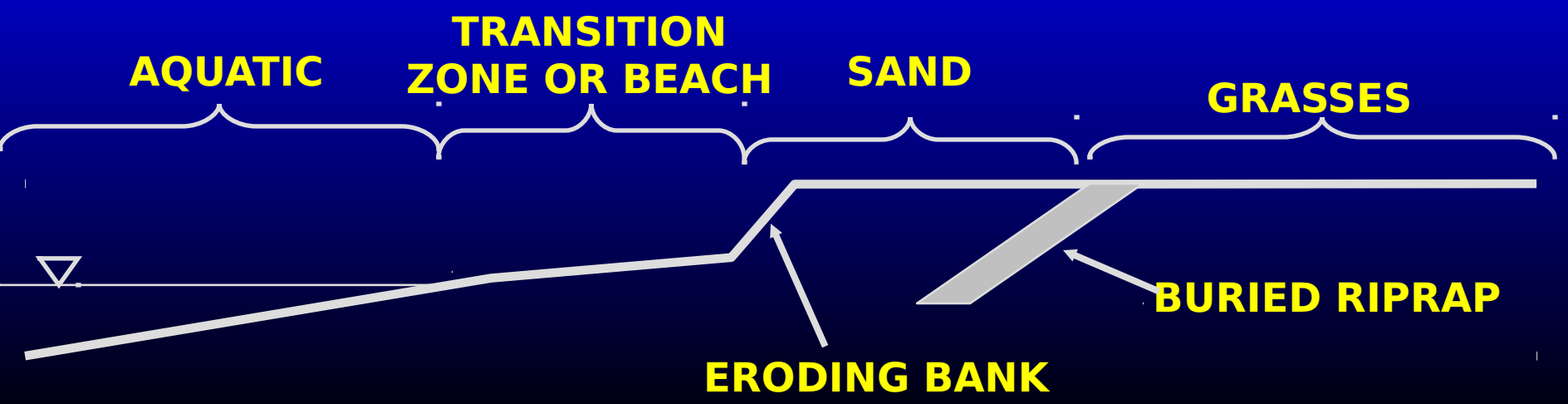
US Army Corps
of Engineers
St. Paul District

SHORELINES

POOL 8, PHASE III MUDFLATS IN SHELTERED AREA

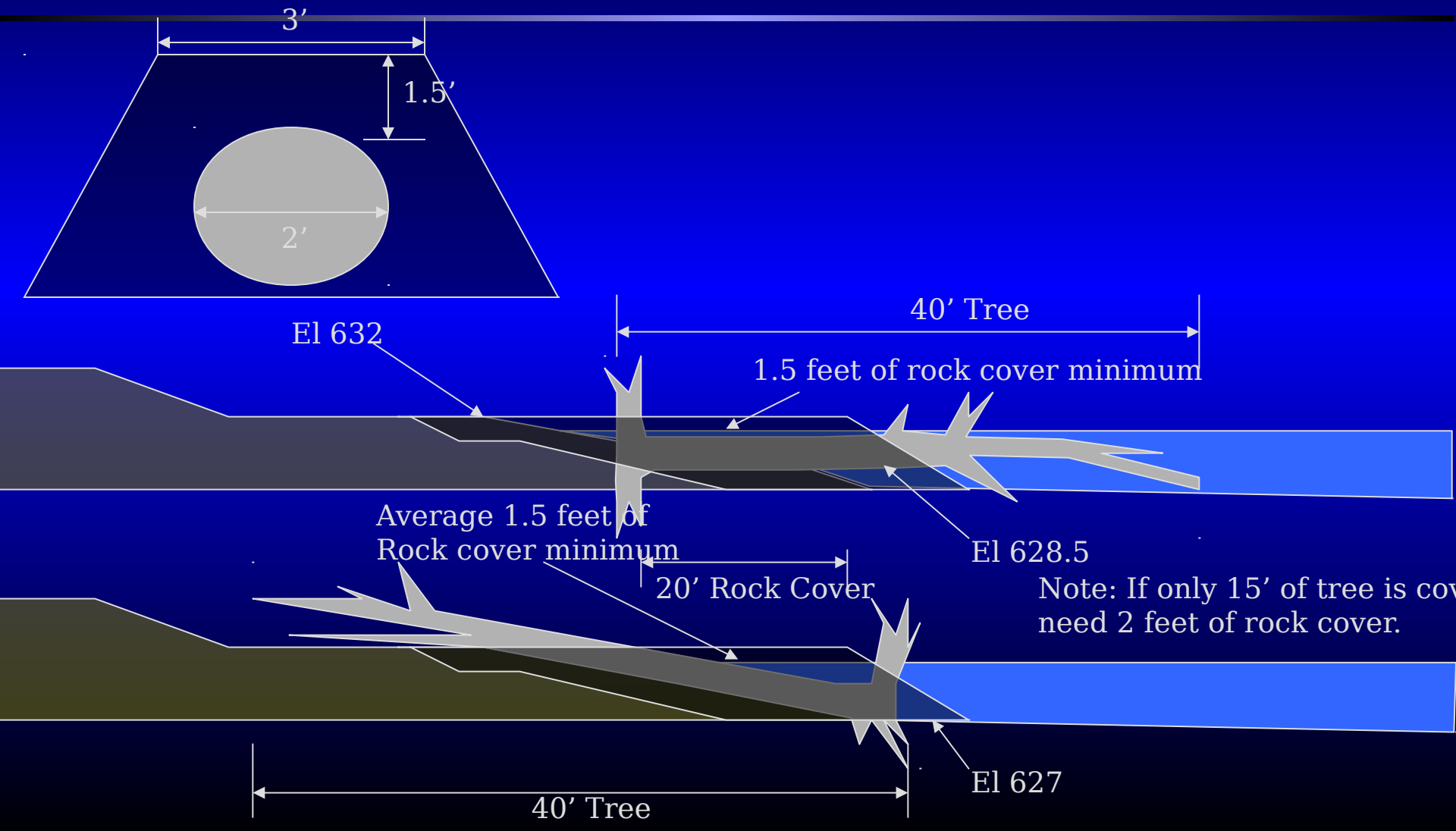


POOL 8, PHASE III SHORELINE



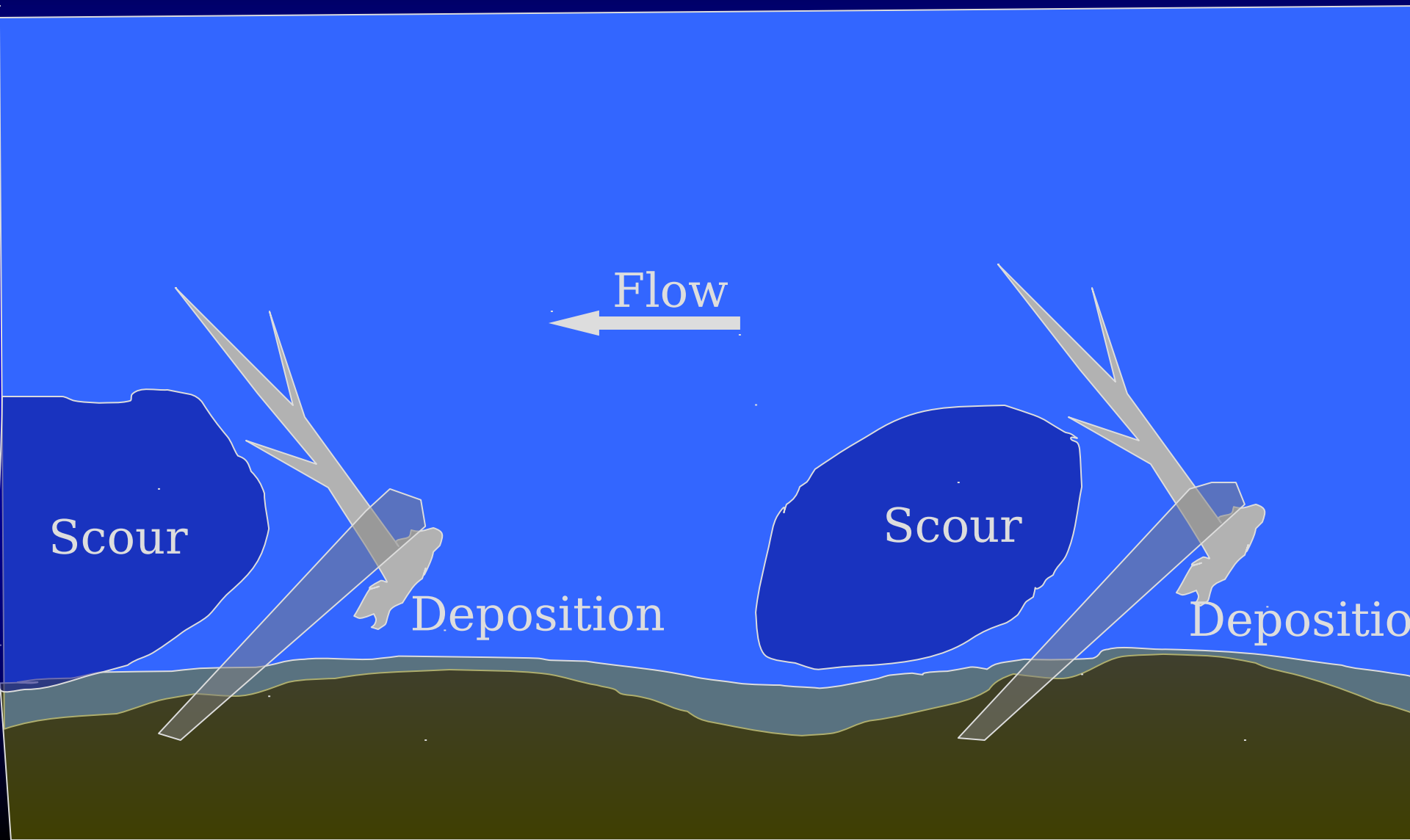
US Army Corps
of Engineers
St. Paul District

Pool 8, Phase III, Groins, 2004



US Army Corps
of Engineers
St. Paul District

Pool 8 Phase III, 2004



US Army Corps
of Engineers
St. Paul District

Conclusion

- Habitat Project Engineering Must Evolve as River Science (Hydrology, Geomorphology, Biology) Evolve.
- Lessons Learned Need to be Incorporated into Future Designs.
- The Large River Habitat Project Engineering Manual: Where is it?

US Army Corps of Engineers
St. Paul District

Acknowledgements

USACE – St. Paul District

Jon Hendrickson, Hydraulic Engineer

Don Powell, Project Manager

Aaron Buesing, Hydraulic Engineer

US Army Corps
of Engineers
St. Paul District

The End